REMARKS

Claims 12-13 and 18-21 are all the claims pending in the application.

I. Response to Claim Rejections under 35 U.S.C. § 103(a)

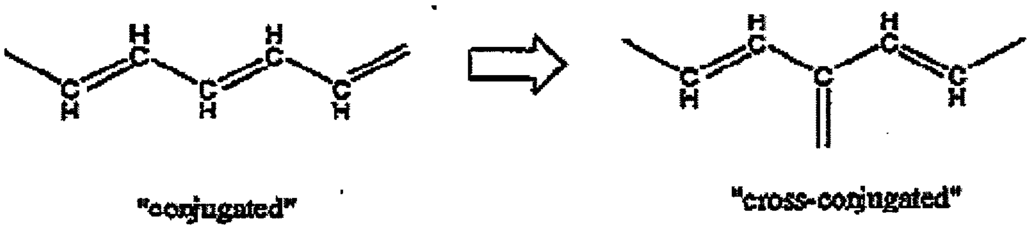
Applicants respectfully submit that with respect to all rejections, the Examiner appears to take the position that the compound of the present invention is a cyanine pigment type compound. However, the compound of the present invention is a cross-conjugated merocyanine pigment type compound. Applicants respectfully request reconsideration of the rejections in view of the above and in view of the following.

A. Inaishi '917, Devoe et al and Feldner et al

In paragraph 3, claims 12 and 13 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Inaishi et al '917, in view of Feldner et al, "Non-linear optical properties of specific polymethines: influence of substituents and chain length", MCLC S&T Sec. B, Nonlinear Optics vol. 26(1-3) pp. 99-106 (2000) and Devoe et al, WO 01/96917.

Applicants respectfully traverse the rejection for the reasons of record, which are incorporated herein, and for the following additional reasons.

The two-photon absorbing compounds (formulae (1) and (3)) used in the present invention are characterized in that they are symmetric merocyanines and, at the same time, they are also cross-conjugated molecules. Cross-conjugated molecules are molecules having a structure as shown below (on the right side). In a conjugated system, carbon-carbon single bonds and carbon-carbon double bonds are repeated alternatively. Cross-conjugated molecules are formed from a conjugated system by substituting one double bond with one single bond to form a carbon atom having two continuous single bonds and further forming a double bond between the carbon atom and another atom.



Although there is disclosure in Inaishi '917 for a photosynthetic composition using one-photon absorption where squarylium is a photosensitive pigment, there is no disclosure nor suggestion at all for using two-photon absorption. Further, with regard to a merocyanine compound, there is no disclosure nor suggestion even for one-photon absorption.

Feldner et al is a scientific article which discloses the two-photon absorbing characteristics of a squarylium pigment and also discloses the two-photon absorbing characteristic of a cyanine pigment and a merocyanine pigment. The merocyanine pigment which is taken up in this article is an asymmetric molecule since it is especially expressed in the first paragraph under "Section Merocyanines" on page 104, as "asymmetric merocyanines." In addition it is mentioned, in the fourth paragraph under "Section Summary and Outlook" at page 106, that "The results for merocyanines must be interpreted with much care. The substituents influence the electron density on the chain, modify the length of the π electron system, and vary the bond-length alternation." So, attention is drawn to the fact that, when a substituent is different, the resulting properties vary. Accordingly, it is difficult and rather unnatural to think of merocyanine pigments and, further, symmetric cross-conjugated merocyanine compounds which are compounds of the present application, from the disclosure of Feldner et al.

In Devoe et al, there is disclosure for photosynthetic compounds utilizing two-photon absorption but there is no specific disclosure of actual compounds having two-photon absorption charateristics. All of the compounds disclosed by Devoe et al are conjugated molecules and there is no symmetric cross-conjugated merocyanine compound which is characteristic of the present invention. Thus, it is difficult for one of ordinary skill in the art to think of the symmetric cross-conjugated merocyanine compounds of the present invention based on the disclosure of Devoe et al.

In view of the above, there is no rational and logical reason for combining Inaishi '917, Feldner et al and Devoe et al.

Accordingly, Applicants respectfully request withdrawal of the § 103 rejection of claims 12 and 13 based on Inaishi '917 in view of Feldner et al and Devoe et al.

B. Smothers et al '977, Devoe et al, Feldner et al and Foucalt et al

In paragraph 4, claims 12 and 13 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Smothers et al '977, in view of Devoe et al WO 01/96917, Feldner et al, "Non-linear optical properties of specific polymethines: influence of substituents and chain length", MCLC S&T Sec. B, Nonlinear Optics vol. 26(1-3) pp. 99-106 (2000) and Foucault et al, "Two photon absorption in organic dyes relation with the symmetry of levels", Optics Comm. Vol. 15(3) pp. 412-415 (1975).

Applicants respectfully traverse the rejection for the reasons of record, which are incorporated herein, and for the following additional reasons.

Smothers '977 discloses an example of photopolymerization using the one-photon absorption of a photopolymerizing composition including a symmetric cross-conjugated merocyanine compound. However, there is no teaching or suggestion of two-photon absorption characteristics of those compounds at all.

Feldner et al and Devoe et al are discussed above and fail to remedy the deficiencies of Smothers '977. There is no disclosure in these references at all which suggests the compounds of the present invention.

Foucault et al reports two-photon absorption characteristics of xanthene pigments and acridine pigments, but does not teach or suggest the two-photon absorption characteristics of the merocyanine compound. Additionally, the theme of this article is that "it was found that two-photon absorption characteristics are unable to be predicted from one-photon absorption characteristics." Therefore, one of ordinary skill in the art would not have been motivated to combine the cited references as suggested by the Examiner.

Accordingly, Applicants respectfully request withdrawal of the § 103 rejection of claims 12 and 13 based on Smothers '977 in view of Devoe et al, Feldner et al and Foucault et al.

C. Matsumura et al '955, Devoe et al, Feldner et al and Foucault et al

In paragraph 5, claims 12 and 13 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Matsumura et al '995, in view of Devoe et al WO 01/96917, Feldner et al, "Non-linear optical properties of specific polymethines: influence of substituents and chain length", MCLC S&T Sec. B, Nonlinear Optics vol. 26(1-3) pp. 99-106 (2000), and Foucault et al, "Two photon absorption in organic dyes relation with the symmetry of levels", Optics Comm. Vol. 15(3) pp. 412-415 (1975).

Applicants respectfully traverse the rejection for the reasons of record, which are incorporated herein, and further based on the following.

Matsumura et al discloses a photoreaction using one-photon absorption of a photoactive composition including symmetric cross-conjugated merocyanine compounds, but there is no teaching or suggestion therein at all of any two photon absorption characteristics of those compounds.

Devoe et al, Feldner et al and Smothers '977 are discussed above and fail to remedy the deficiencies of Matsumura. Additionally, there is no motivation for combining the references with a reasonable expectation of success. Thus, the present invention is not rendered obvious by the cited references, whether taken alone or in combination.

Accordingly, Applicants respectfully request withdrawal of the § 103 rejection of claims 12 and 13 based on Matsumura et al in view of Devoe et al, Feldner et al and Foucault et al.

D. Zammit et al in view of Devoe et al, Feldner et al and Foucault et al

In paragraph 6, claims 12 and 13 are rejected under 35 U.S.C. § 103 as allegedly being unpatentable over Zammit et al, "Visible light pulsed laser polymerization at 532 nm employing a julolidine dye photosensitizer initiation system", Macromolecules Vol. 30 (19) pp. 5655-5659 (1997), in view of Devoe et al, WO 01/96917, Feldner et al, "Non-Linear optical properties of specific polymethines: influence of substituent and chain length", MCLC S&T Sec. B, Nonlinear Optics vol. 26(1-3) pp. 99-106 (2000) and Foucault et al, "Two photon absorption in organic dyes relation with the symmetry of levels", Optics Comm. Vol. 15(3) pp. 412-415 (1975).

Applicants respectfully traverse the rejection for the reasons of record, which are incorporated herein, and further based on the following.

Zammit discloses an example of a photopolymerization reaction using one-photon absorption of photopolymer compositions including symmetric cross-conjugated merocyanine compounds of the present invention, but there is no teaching or suggestion at all of any two-photon absorption characteristics of those compounds.

Devoe et al, Feldner et al and Foucault et al are discussed above and fail to remedy the deficiencies of Zammit. Additionally, there is no motivation for combining the references with a reasonable expectation of success. Thus, the present invention is not rendered obvious by the cited references, whether taken alone or in combination.

Accordingly, Applicants respectfully request withdrawal of the § 103 rejection of claims 12 and 13 based on Zammit et al in view of Devoe et al, Feldner et al and Foucault et al.

E. Brooker et al '351 or Brooker et al '964 in view of Wu et al combined with Feldner et al and/or Foucault et al

In paragraph 7, claims 12 and 13 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Brooker et al '351 or Brooker et al '964, in view of Wu et al, "Two photon exposure of photographic film" JOSA B:Opt. Phys. Vol. 16(4) pp. 605-608 combined with Feldner et al, "Non-linear optical properties of specific polymethines: influence of substituents and chain length", MCLC S&T Sec. B, Nonlinear Optics vol. 26(1-3) pp. 99-106 (2000) and/or Foucault et al "Two photon absorption in organic dyes relation with the symmetry of levels", Optics Comm. Vol. 15(3) pp. 412-415 (1975).

Applicants respectfully traverse the rejection for the reasons of record, which are incorporated herein, and further based on the following.

Wu et al is a scientific article in which two-photon absorption characteristics of photographic films are reported. In the third paragraph of this article, the two-photon absorption characteristic of AgCl is reported as prior research and, taking this into consideration, it is mentioned that the two-photon absorption should occur in common photographic films as well.

> Prior work on two-photon absorption in AgCl has demonstrated. . . . The two-photon absorption coefficient near 4.1 eV has been measure as 1.25×10^{-4} cm/MW, ... Thus standard photographic film could serve as a recording medium for two-photon processes.

Thus, in accordance with the logic of the authors of this article, the actual substance which carries out the two photon absorption is AgCl crystals and, therefore, it is easy to think of other silver halides (such as AgI and AgBr) or other inorganic compounds as two-photon absorbing materials. However, the idea of using an organic pigment compound as a two-photon absorbing material would not have been considered because, in view of the fact that AgCl was reported to be the actual substance for conducting the two-photon absorption, there is no logical reason to think of using an organic pigment compound as the two-photon absorbing material. Accordingly, Wu et al teaches away from the present invention. Further, one of ordinary skill in the art would not have been motivated to combine Wu et al with Feldner et al, Focault et al, Brooker et al '351 or Brooker et al '964 with a reasonable expectation of success.

Accordingly, Applicants respectfully request withdrawal of this § 103 rejection.

F. Brooker et al '805 or Brooker et al '939 in view of Wu et al combined with Feldner et al and/or Foucault et al

In paragraph 8, claims 12, 13 and 18-19 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over either of Brooker et al '805 or Brooker et al '939 (listed as White on PTO 892), in view of Wu et al "Two photon exposure of photographic film" JOSA B: Opt. Phys. Vol. 16(4) pp. 605-608 combined with Feldner et al, "Non-linear optical properties of specific polymethines: influence of substituents and chain length", MCLC S&T Sec. B, Nonlinear Optics vol. 26(1-3) pp. 99-106 (2000) and/or Foucault et al "Two Photon absorption in organic dyes relation with the symmetry of levels", Optics Comm. Vol. 15(3) pp. 412-415 (1975).

Applicants respectfully traverse the rejection for the reasons of record, which are incorporated herein, and further based on the reasons set forth in section I(E) above since Brooker et al '805 and Brooker et al '939 are cumulative to Brooker et al '351 and Brooker et al '964.

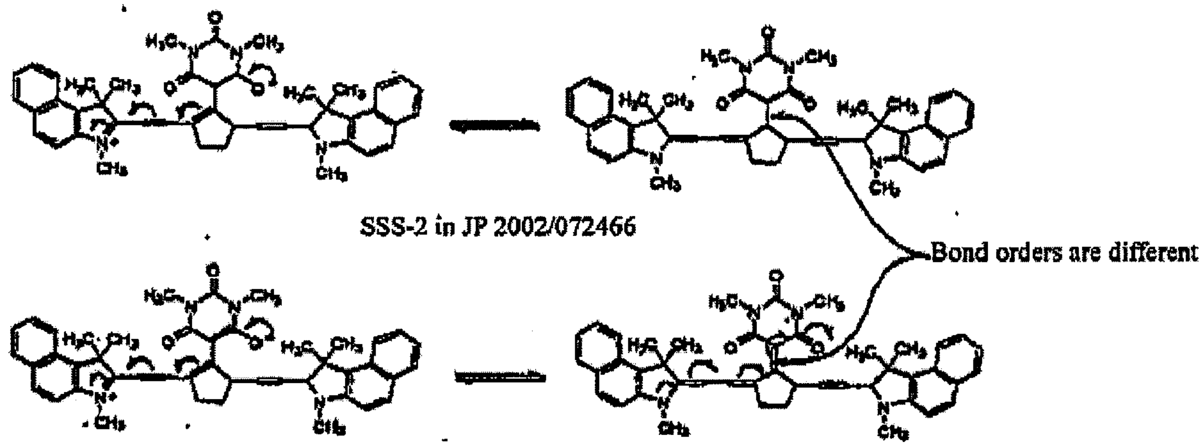
Accordingly, Applicants respectfully request withdrawal of this § 103 rejection of claims 12, 13 and 18-19.

G. Brooker et al '805 or Brooker et al '939 in view of Wu et al combined with Feldner et al and/or Foucault et al and further in view of JP 2002-072466

In paragraph 9, claims 12, 13 and 18-21 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over either of Brooker et al '805 or Brooker et al '939 (listed as White on PTO 892), in view of Wu et al "Two photon exposure of photographic film" JOSA B: Opt. Phys. Vol. 16(4) pp. 605-608 combined with Feldner et al "Non-linear optical properties of specific polymethines: influence of substituents and chain length:, MCLC S&T Sec. B, Nonlinear Optics vol. 26(1-3) pp. 99-106 (2000) and/or Foucault et al "Two photon absorption in organic dyes relation with the symmetry of levels", Optics Comm. Vol. 15(3) pp. 412-415 (1975), further in view of JP 2002-072466.

Applicants respectfully traverse the rejection for the reasons of record, which are incorporated herein, and further based the reasons set forth above in sections I(E) and I(F).

Additionally, the Examiner mentions that the compound SSS-2 of JP '466 is included in the formula of the present invention. However, as shown in the following resonance-contributing structures, said compound is different from the compound of the present invention in terms of the resonance-contributing structure and, therefore, there is no reason for combining the cited references.



SSS-2 in JP 2002/072466

Bond orders are different

An example of compounds of the present application

The π electron of SSS-2 resonates between nitrogen atoms on the right and left indonylene rings whereby the compound is a cyanine pigment. On the other hand, the π electron of the compound of the present invention resonates among nitrogen atoms on the right and left indonylene rings and carbonyl oxygen atoms of the central barbituric acid moiety being in a crossed conjugation, whereby the compound is a merocyanine pigment.

Accordingly, Applicants respectfully request withdrawal of this § 103 rejection of claims 12, 13 and 18-21.

H. JP 2002-072466 in view of Devoe et al, Feldner et al and Foucault et al

In paragraph 10, claim 12 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over JP 2002-072466, in view of Devoe et al, WO 01/96917, Feldner et al, "Non-linear optical properties of specific polymethines: influence of substituents and chain length:, MCLC S&T Sec. B, Nonlinear Optics vol. 26(1-3) pp. 99-106 (2000) and/or Foucault et al "Two photon absorption in organic dyes relation with the symmetry of levels", Optics Comm. Vol. 15(3) pp. 412-415 (1975).

Applicants respectfully traverse the rejection for the reasons of record, which are incorporated herein, and further based on the following.

As mentioned above in section I(G), JP '466 relates to pigments in a category different from the compounds of the present invention, and, further, Devoe et al, Feldner et al and Foucault et al do not suggest the compounds of the present invention for the same reasons as mentioned above. Accordingly one of ordinary skill in the art would not have been motivated to combine the references with a reasonable expectation of success in achieving the claimed invention.

In view of the above, Applicants respectfully request withdrawal of this § 103 rejection.

I. Urano et al '356 or JP 09-134009 in view of Marder et al '683, Devoe et al, Feldner et al and Foucault et al

In paragraph 11, claim 12 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over either of Urano et al '356 or JP 09-134009, in view of Marder et al '683, Devoe et al, WO 01/96917, Feldner et al "Non-linear optical properties of specific polymethines: influence of substituents and chain length", MCLC S&T Sec. B, Nonlinear Optics vol. 26(1-3) pp. 99-106 (2000) and Foucault et al, "Two photon absorption in organic dyes relation with symmetry of levels" Optics Comm. Vol. 15(3) pp. 412-415 (1975).

Applicants respectfully traverse the rejection for the reasons of record, which are incorporated herein, and further based on the following.

Although Urano et al and JP '009 disclose photopolymer compositions including compounds which are within the scope of the compounds of formulae (1) and (3) of the present invention, there is no teaching or suggestion in these references at all of any two-photon absorption characteristics of the disclosed compounds.

Further, although Marder et al discloses two-photon absorption characteristics of a simple π conjugated compound, there is no teaching or suggestion at all of the symmetric cross-conjugated merocyanine compounds of the present invention.

Since Devoe et al, Feldner et al and Focault et al do not teach or suggest the compound of the present invention as discussed above, one of ordinary skill in the art would not have been led to Urano et al and JP '009 even if the teachings of Marder et al, Devoe et al, Feldner et al and Marder et al were combined. Thus, it appears that the Examiner has engaged in improper hindsight reasoning as there is no apparent reason for combining the cited references with a reasonable expectation of success of achieving the present invention.

Accordingly, Applicants respectfully request withdrawal of this § 103 rejection.

II. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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